

**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:	)	Group Art Unit: 1796
	)	
David Lee DAVIDSON <i>et al</i>	)	Examiner: Timothy S. Chiang
	)	
Serial No.: 10/534,086	)	Attorney Docket No.: S-109
	)	
Filed: May 6, 2005	)	Confirmation No.: 2388
Title: HEAT TRANSFER FLUIDS FOR APPLICATION OVER A BROAD RANGE OF TEMPERATURES		

**APPEAL BRIEF**

This is an appeal from the final rejection of the above-identified application made in the Office Action dated May 25, 2010. A Notice of Appeal was filed on August 24, 2010.

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**I. REAL PARTY IN INTEREST**

The real party in interest in this appeal is Solutia Inc.

## **II. RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any pending appeals or interferences which may directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

### **III. STATUS OF CLAIMS**

The status of the claims is as follows: claims 1 to 15. This is an appeal from the rejection of pending claims 1 to 15; claim 1 is the only independent claim. The claims on appeal are set forth in full in the Appendix to this Brief.

#### **IV. STATUS OF AMENDMENTS**

None – Appellants did not seek to enter any amendments after the Office Action dated May 25, 2010.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

This section provides a concise explanation of the subject matter defined in the independent claim involved in this appeal, namely claim 1. Claim 1 is a heat transfer fluid, for use over a broad range of temperatures, consisting essentially of a component selected from the group consisting of a mixture of at least two structurally non-identical saturated cycloalkane-alkyl or -polyalkyl components, a mixture of, at least, two structurally non-identical saturated aliphatic hydrocarbons having a linear or branched chain with from 5 to 15 carbon atoms, and mixture of, at least, a saturated cycloalkane-alkyl or -polyalkyl, wherein the moieties have specific limitations. [Spec. p. 1, lines 1-22]. The heat transfer fluid mixture components are at a level such that the composition has: a cloud point below -100 °C; a vapor pressure, at +175 °C, below 1300 kPa; and a viscosity, measured at the cloud point temperature +10 °C, below 400 cP. [Spec. p. 1, lines 1-22]. Specifically, the mixture comprises:

(a) a mixture of at least two structurally non-identical saturated cycloalkane-alkyl or -polyalkyl components, wherein the cycloalkane moiety contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10;

(b) a mixture of, at least, two structurally non-identical saturated aliphatic hydrocarbons having a linear or branched chain with from 5 to 15 carbon atoms; and

(c) a mixture of, at least, a saturated cycloalkane-alkyl or -polyalkyl, wherein the cycloalkane moiety contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10, and a saturated aliphatic hydrocarbon having a linear or branched chain with from 5 to 15 carbon atoms. [Spec. p. 1, lines 1-22].

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

1) Whether claims 1 to 7, 10 and 12 to 15 are anticipated under 35 U.S.C. § 102(b) by Hsu, U. S. Patent Number 6,086,782 [hereinafter referred to as Hsu].

2) Whether claims 8, 9 and 11 are unpatentable under 35 U.S.C. 103(a) over Hsu in view of Praller, WO 01/92436 [hereinafter referred to as Praller].



## VII. ARGUMENT

Appellants' invention is directed to a heat transfer fluid for use over a broad range of temperatures, wherein the fluid consists essentially of a component selected from the group consisting of (a) a mixture of at least two structurally non-identical saturated cycloalkane-alkyl or -polyalkyl components, (b) a mixture of, at least, two structurally non-identical saturated aliphatic hydrocarbons having a linear or branched chain with from 5 to 15 carbon atoms; and (c) a mixture of, at least, a saturated cycloalkane-alkyl or -polyalkyl and a saturated aliphatic hydrocarbon having particular carbon numbers. The cycloalkane moiety of the first mixture contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10. The cycloalkane moiety contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10, and a saturated aliphatic hydrocarbon having a linear or branched chain with from 5 to 15 carbon atoms. The composition has: a cloud point below  $-100^{\circ}\text{C}$ , a vapor pressure, at  $+175^{\circ}\text{C}$ , below 1300 kPa; and a viscosity, measured at the cloud point temperature  $+10^{\circ}\text{C}$ , below 400 cP. (Claim 1). The dependent claims (claims 2 to 15) are directed to specific features of the invention.

In the Office Action of May 25, 2010 in the present case, the Examiner stated that Hsu discloses the following: a combination of at least one terpene, including menthane, and another terpene, 1,1-dimethylcyclohexane, that these compounds are cycloalkane-alkyl groups with alkyl moieties having between 1 to 10 carbons that meet claim 1(a); acyclic terpenes such as myrcene, said to be an aliphatic hydrocarbon; and a combination of both an acyclic terpene such as

myrcene and a cyclic terpene such as menthane are said to meet the limitations of claim 1(c); that the compositions are liquids at -175°F, citing column 10, lines 21-24, with 'many' compositions expected to be fluid at temperatures lower than -175°F, citing column 10, lines 26-29, and that the other limitations of claim 1 are understood to be inherent; the combination of menthane and 1,1-dimethylcyclohexane meets the limitations of claim 2; the combination of myrcene, identified as a C<sub>10</sub> aliphatic hydrocarbon but listed in Table 2 of Hsu as a terpene, and menthane meets the limitations of claim 3; the physical properties of viscosity and vapor pressure of claims 4 and 5 would be inherent, and that menthane and 1,1-dimethylcyclohexane together and menthane and myrcene together inherently have the properties recited in the pending claims; the combination of menthane and 1,1-dimethylcyclohexane meet the limitations of claim 6; with regard to claims 7, 10 and 12 to 14, the limitations drawn to species 1(b) and 1(c) of independent claim 1 are non-elected for examination by the Examiner; and the freezing (cloud) point of claim 15 and other physical properties are inherent.

With regard to the rejection of claims 8, 9 and 11 under 103(a), the Examiner repeats the rejections over claim 1 and the allegedly inherent properties, and further identifies, at Hsu column 4, lines 8-10, a mixture of about 50 volume percent cumene in d-limonene. Cumene is identified as an alkylbenzene, d-limonene is listed in Hsu's Table 2 as a cyclic terpene, and pure limonene is characterized as 95.6 weight percent limonene with 2.7 weight percent myrcene. The Examiner states that Hsu differs from the instant application because Hsu does not disclose the following: the weight ratio ranges of claims 8 and 10 to 14; the cycloalkane-alkyl components of methylcyclohexane and ethylcyclohexane; and the limitations of aliphatic alkane components of the compositions set forth in claims 7 and 14. (Appellants respectfully note that only claims 8, 9 and 11 are subject to the obviousness rejection under 103(a) at issue.) The

Examiner construes the disclosure in Hsu of a composition "consisting of a mixture of d-limonene and cumene, wherein the composition consists of about 50% by volume of cumene in d-limonene" (col. 4, lines 8-10) as a teaching of a weight ratio between two components of any heat transfer fluid, including combinations of cycloalkane-alkyl components, aliphatic hydrocarbon components, or a mixture of cycloalkane-alkyl components and aliphatic hydrocarbon components, "given that the components in combination have comparable size." *See* Office Action, page 6. The Examiner asserts that Hsu's disclosure is a disclosure of saturated molecules of similar size and volume because there is only one carbon difference between them.

The Examiner further asserts that "[o]ne skilled in the art would find obvious to consider 1:1 weight ratios of two-component heat transfer fluids and therefore, find obvious the weight ratio limitations of instant claims 9, 10-14." *See* Office Action, page 6. The Examiner admits that 1,1-dimethylcyclohexane disclosed in Hsu does not meet claim 9, but asserts that the difference, one methyl group in the "1-" position, or "substitution of the dimethyl group with an ethyl group," would have been obvious, and cites the Manual of Patent Examining Procedure §2144.09 in support of this position. *See* Office Action, page 7. The Examiner further asserts that the structural differences between the claimed compounds and the disclosed compound "would not significantly alter the physical/chemical properties of 1,1-dimethylcyclohexane in its function in heat-transfer fluids." *See* Office Action, page 7. The Examiner relies on Praller for a disclosure of 2- and 3-methyl pentane, asserting that Praller is analogous art as "drawn to a heat transfer fluid for low temperature applications comprising cycloalkane-alkyl and aliphatic hydrocarbon components." *See* Office Action, page 7. The Examiner concludes that Hsu's at least one terpene, "which is further disclosed" as including menthane, 1,1-dimethylcyclohexane

and aliphatic hydrocarbon terpenes such as myrcene, combined with the methyl pentanes of Praller, “encompasses the instant claim 7 in its entirety.” *See* Office Action, page 8.

In the Response to Arguments section, the Examiner states that “Hsu clearly states that more than one terpenes disclosed in Table 2 may be used presumably in combination with each other (col. 7, lines 56-60).” *See* Office Action, page 8. The Examiner does not cite any support for this conclusory statement. The Examiner further states that Appellants’ argument regarding the transitional phrase “consisting essentially of” was unpersuasive and stated that “consisting essentially of” limits the scope of a claim to the specified materials or steps and those that do not materially affect the basic and novel characteristics of the claimed invention, and concluded that “Hsu’s teaching of alkyl benzene in composition does not preclude the reference as anticipatory if it is shown that the presence of alkyl benzene materially affects the basic and novel characteristics of the claimed invention.” *See* Office Action, pages 8-9. Appellants respectfully submit that the Examiner’ statement is incorrect. Hsu’s teaching of alkyl benzene does not preclude the reference as anticipatory if it is shown that the presence of alkyl benzene does not materially affect the basic and novel characteristics of the claimed invention.

Finally, the Examiner states that with regard to Appellants’ arguments pertaining to non-elected species 1(b) and 1(c), “independent claim 1 allows for the examiner to elect for examination, the species 1(a), which is rejected over the prior art reference”. Appellants respectfully disagree, but as discussed below, Appellants respectfully submit that all species are allowable over the prior art.

Appellants contended in their response, and continue to contend in this Appeal Brief, that the claims 1 to 15 are neither anticipated by Hsu nor obvious over Hsu in view of Praller since Hsu neither anticipates claims 1 to 7, 10 and 12 to 15 nor makes obvious, alone or in

combination with Praller, claims 8, 9 and 11. *See* Amendment and Remarks (March 23, 2010), pages 10 to 26.

With regard to claim 1(a), Hsu does not disclose a heat transfer fluid comprising menthane and 1,1-dimethylcyclohexane together; these compounds are merely two listings in a table of approximately 100 terpenes. The menthane and 1,1-dimethylcyclohexane compounds are not used in any example, and certainly there is no example of this combination since Hsu requires and the examples comprise both a terpene and an alkylbenzene. Both menthane and 1,1-dimethylcyclohexane are terpenes as identified in Table 2 of Hsu; neither menthane nor 1,1-dimethylcyclohexane is an alkylbenzene (defined at column 9, lines 41-42, as “a benzene alkylated with a hydrocarbon”), which is required in Hsu’s composition.

Appellants respectfully submit that Hsu clearly requires an alkylbenzene, for, as described at column 7, lines 26-29, “[i]t has been surprisingly found that alkylbenzenes can be mixed with terpenes to obtain heat transfer fluid compositions that exhibit characteristics which are superior to either component alone.” Thus, Hsu teaches that a fluid comprising two terpenes, such as menthane and 1,1-dimethylcyclohexane, would not be satisfactory. Appellants respectfully submit that Hsu teaches **unambiguously** that an alkylbenzene **does** materially affect basic and novel characteristics of Hsu’s composition.

Regarding claim 1(b), Hsu appears not to identify any saturated aliphatic linear or branched saturated hydrocarbons having 5 to 15 carbon atoms, and regarding claim 1(c), Hsu discloses myrcene and dihydromyrcene, but neither is saturated, as required for claim 1(c).

Appellants respectfully submit that Hsu is silent with regard to cloud point, vapor pressure at 175°C, and viscosity measured at a temperature 10°C higher than the cloud point. Viscosity is the only property mentioned in Hsu, but, since cloud point is not mentioned, the

viscosity at a temperature related to the cloud point is not and cannot be disclosed. Hsu discloses that viscosity is related to the composition of the fluid and discloses that limonene gels at about -140°F. A gel comprising a single compound may be thought of as a fluid having a very high viscosity. Hsu teaches that limonene might be acceptable in a blend taught by Hsu, but Hsu teaches nothing about the three properties and characteristics set forth in claim 1.

Hsu's disclosure of myrcene is not relevant to Appellants' claims, and Hsu discloses no saturated aliphatic hydrocarbons that meet the claimed limitations. Appellants respectfully submit that Hsu's disclosure of two specific compounds out of approximately 100 compounds in Hsu's table does not disclose a **combination** of these two compounds, not does it disclose a heat transfer fluid having certain properties as claimed by Appellants. Appellants respectfully submit that Hsu does not disclose a combination of two terpenes, but rather, Hsu discloses and requires a combination having both a terpene and an alkylbenzene. Since the proposed combinations cited by the Examiner (menthane and 1,1-dimethylcyclohexane, or myrcene and menthane) comprise two terpenes (that is, none of menthane, 1,1-dimethylcyclohexane or myrcene are an alkylbenzene), Appellants respectfully submit that Hsu does not and cannot disclose or suggest the proposed combination of Appellants' claims. In fact, since Hsu requires both a terpene and an alkylbenzene, Appellants respectfully submit that Hsu teaches away from Appellants' claimed heat transfer fluid because Hsu does not disclose or suggest the combination of two terpenes, or any combination without an alkylbenzene, as a heat transfer fluid.

Appellants additionally respectfully submit that the pending claims are essentially limited to saturated compounds, therefore, the disclosure of myrcene, cumene, limonene, or any other compound that is not saturated, is not relevant. Hsu's disclosure of two compounds such as menthane and 1,1-dimethylcyclohexane in a table of about 100 terpenes does not disclose **the**

**combination** of these two terpenes. Each of menthane and 1,1-dimethylcyclohexane is identified in Hsu as a terpene, but the combination of menthane and 1,1-dimethylcyclohexane is not suggested by Hsu. Instead, as previously stated, Hsu is directed to a combination of a terpene with an alkylbenzene. The following selection of citations from Hsu illustrate this combination.

Heat transfer fluid compositions comprising (a) a terpene component, comprising at least one terpene; and (b) an alkylbenzene component, comprising at least one alkylbenzene. (Abstract)

It has been surprisingly found that heat transfer fluid compositions comprising (a) a terpene component, comprising at least one terpene; and (b) an alkylbenzene component, comprising at least one alkylbenzene; are suitable for use as heat exchange liquids for low temperature applications. (Column 2, lines 52-56)

It is another object of the invention to provide heat transfer fluid compositions comprising (a) a terpene component, comprising at least one terpene; and (b) an alkylbenzene component, comprising at least one alkylbenzene. (Column 3, lines 1-5)

It has been surprisingly found that alkylbenzenes can be mixed with terpenes to obtain heat transfer fluid compositions that exhibit characteristics which are superior to either component alone. ... It has been discovered that mixtures of terpene and alkylbenzene produce distinctly different physical properties as compared to either terpenes or alkylbenzene alone. Particularly, it has been discovered that certain heat transfer fluid compositions comprising a terpene component, comprising at least one terpene, and an alkylbenzene component, comprising at least one alkylbenzene, exhibit freezing point temperatures that are lower than either the terpene or the alkylbenzene component alone.

The heat transfer fluid compositions of the invention comprise (a) a terpene component, comprising at least one terpene; and (b) an alkylbenzene component, comprising at least one alkylbenzene. (Column 7, lines 26-29 and 33-46)

Appellants respectfully submit that Hsu's teaching is clear and unambiguous and that both a terpene and an alkylbenzene are required in any combination. Hsu does not disclose a heat transfer fluid that is the combination of two terpenes without an alkylbenzene, such as menthane and 1,1-dimethylcyclohexane, either explicitly or inferentially, nor can a combination of two terpenes without an alkylbenzene be suggested since Hsu clearly teaches that an alkylbenzene is required in any combination. Additionally, as previously discussed, the "consisting essentially of" language of Appellants' claims precludes unsaturated materials that materially affect basic and novel characteristics of the claimed invention.

Hsu teaches a mixture of 50 volume percent cumene in limonene, but neither compound is a saturated compound. Similarly, Hsu discloses that commercially-available limonene often comprises 95.6 weight percent limonene and 2.7 weight percent myrcene. Again, neither of these compounds is saturated. Hsu also does not disclose the weight ratio limitations, methylcyclohexane or ethylcyclohexane, or the aliphatic alkane compounds of claims 7 and 14.

All of Appellants' claims are directed to heat transfer fluids that (1) consist essentially of (2) saturated hydrocarbons and (3) have properties and characteristics that are not inherently disclosed in other heat transfer fluid compositions. In the Final Office Action of November 23, 2009, the Examiner stated that the transitional phrase 'consisting essentially of' is 'half-open and does not necessarily preclude the inclusion of other components', and Appellants argued that the Examiner's assertion was irrelevant and that 'consisting essentially of' is not "half-open," which is an ambiguous phrase that is meaningless in patent prosecution practice. *See* Amendment and



Remarks (March 23, 2010), page 16. Appellants resubmit that it is well-settled that the phrase ‘consisting essentially of’ means that ingredients that materially affect basic and novel characteristics of the claimed composition are excluded. *Atlas Powder Co. v. E. I. du Pont de Nemours & Co.*, 750 F.2d 1569 (Fed. Cir. 1984) (emphasis added). Therefore, because Hsu discloses that an alkylbenzene is *required* in Hsu’s composition, because the composition gels if an alkylbenzene is not there, alkylbenzene is an ingredient that **does materially affect** the basic and novel characteristics of the claimed composition. Therefore, alkylbenzenes are **excluded** because they are components that are necessarily present in the compositions of Hsu in a concentration sufficient to **materially affect** the basic and novel characteristics of Hsu’s heat transfer fluid. Appellants further submit that even if Hsu suggested that menthane and 1,1-dimethylcyclohexane were to be used together, which Appellants do not admit is disclosed or suggested in Hsu, Hsu *further requires* that an alkylbenzene be added, because the terpene component alone is insufficient.

Therefore, as stated by the Examiner in the Response to Arguments, the transitional phrase “consisting essentially of” limits the scope of a claim to the specified materials or steps and those that **do not materially affect the basic and novel characteristics of the claimed invention**. The Examiner concluded that “Hsu’s teaching of alkyl benzene in composition does not preclude the reference as anticipatory if it is shown that the presence of alkyl benzene materially affects the basic and novel characteristics of the claimed invention.” Appellants respectfully submit that the Examiner’s statement is erroneous, and since the presence of alkylbenzene **does materially affect** the basic and novel characteristics of the invention, as previously discussed, alkylbenzene **cannot** be added to Appellants’ heat transfer fluid, and therefore Hsu does not anticipate Appellants’ claims.

Appellants respectfully submit that contrary to the assertions of the Examiner, the properties and characteristics of the claimed compounds are not inherently disclosed in Hsu. Information in the specification clearly illustrates that the properties and characteristics of these compounds are related to composition, both by difference in proportion and difference in structure, even by only one carbon atom (for example, ethylcyclohexane and methylhexane), and that small differences in either can result in a profound difference in the properties and characteristics of the resultant heat transfer fluids.

The following comparisons, taken from the table in paragraph 22 of the pending patent application publication, are instructive. These are only exemplary of the changes in properties with changes in composition or proportion. In the table, property C is vapor pressure at 175°C, in kPa, and property D is viscosity in cP at the cloud point temperature + 10°C:

<b>Sample Numbers Compared</b>	<b>Change and Effect Thereof</b>
8 and 17	Change of proportion and from methyl-cyclopentane to ethyl-cyclohexane changes C and D
20 and 21	Small difference in proportion changes C and D in opposite directions
25 and 26	Change from ethyl-cyclohexane to 2-methyl-hexane changes C and D in opposite directions
43 and 46	Change from 2-methyl-hexane to ethyl-cyclohexane changes C and D in opposite directions
17 and 19	Change from ethyl-cyclohexane to 2-methyl-hexane changes C and D in opposite directions
29 and 30	Small difference in proportion changes C and D in opposite directions
35 and 37	Change from 2-methyl-hexane to ethyl-cyclohexane changes C and D in opposite directions
72 and 73	Change from 2-methylpentane to 3-methylpentane changes C and D

The Examiner identifies a proposed combination of two terpenes, menthane and 1,1-dimethylcyclohexane, from lists of components in Hsu, as anticipatory of part (a) of claim 1, which is only one of the three parts of the Markush Group of claim 1. The Examiner does not

assert that Hsu meets part (b) or part (c) of claim 1, the second component of the Markush Group, but instead states that part (a) has been elected by the Examiner.

Appellants respectfully submit that as previously discussed, two terpene compounds are not used together in Hsu, and, more importantly, cannot be used in Hsu as a heat transfer fluid as neither is an alkylbenzene, as required by Hsu. Rather, this proposed combination was selected by the Examiner using impermissible hindsight from the many combinations from Table 2 only in view of the teachings of the pending application. Since alkylbenzene, which is required in Hsu, is **excluded** by the transitional phrase in the pending claims, Hsu cannot anticipate the claims. The Examiner further asserts that two compounds, myrcene and menthane, meet the limitations of part (c), but Appellants respectfully disagree. Not only does Hsu not disclose the use of these two compounds together, but also, and more importantly, these two compounds together do not form a heat transfer fluid of Hsu containing a terpene and an alkylbenzene. Further, myrcene is not a saturated compound, as required by Appellants' claims.

Appellants respectfully submit that the assertion that the properties and characteristics recited in claim 1 are inherent to the composition is not well-founded. Whereas it is true that the properties and characteristics of a composition are related to the ingredients in the composition, the Examiner's assertion is not relevant to patentability for many reasons. In particular, this assertion does not address the point that each composition will have a different set of properties and characteristics depending on the components selected, and there is no reason to expect that any, or all, properties and characteristics will fall within the claimed limitation. Appellants respectfully submit that the properties and characteristics of the compounds claimed herein are not inherently disclosed in Hsu. Hsu does not discuss cloud point, vapor pressure, or viscosity at a temperature 10°C above the cloud temperature, therefore, one cannot assert that Hsu's

compositions anticipate the properties of claim 1 without knowing these values. Further, since Hsu neither discloses nor suggests a combination having two terpenes (or any combination without an alkylbenzene), Hsu's compositions could not inherently possess the claimed properties. This assertion by the Examiner does not establish anticipation or a *prima facie* case for obviousness.

Hsu discloses that

It has been discovered that mixtures of terpene and alkylbenzene produce distinctly different physical properties as compared to either terpenes or alkylbenzene alone. Particularly, it has been discovered that certain heat transfer fluid compositions comprising a terpene component, comprising at least one terpene, and an alkylbenzene component, comprising at least one alkylbenzene, exhibit freezing point temperatures that are lower than either the terpene or the alkylbenzene component alone. (Column 7, lines 30-42, emphasis added)

Appellants therefore respectfully submit that the properties and characteristics are not disclosed in Hsu, inherently or otherwise, and cannot be said to be inherently disclosed. The Examiner ignores the point that, because Hsu requires an alkylbenzene as a part of the heat transfer fluid, Hsu cannot anticipate the claimed invention. Further, Hsu does not suggest that any heat transfer fluid can be useful without an alkylbenzene. The rejection again relies on the selection of two compounds **only** because they meet the limitations of Appellants' claims, without a suggestion or reason, except for Appellants' disclosure, to select those two compounds from the approximately 100 illustrative compounds set forth. The disclosure of Hsu clearly teaches that a combination of these two compounds would not be a satisfactory heat transfer fluid.

Appellants further respectfully submit that there is no suggestion to combine Hsu with Praller. Hsu requires a combination of an alkylbenzene and a terpene, and the compounds of

Praller are neither terpenes nor alkylbenzenes (the Examiner stated that Praller discloses heat transfer fluids based on methyl pentanes). Therefore, Hsu cannot be successfully combined with Praller, since neither Praller nor Hsu, either alone or in combination, disclose a combination of two terpenes having Appellants' claimed limitations. As previously discussed, Hsu requires an alkylbenzene, which is not and cannot be present in the proposed combination of two terpenes with the compounds (such as pentanes) of Praller. Additionally, Appellants respectfully submit that the skilled practitioner would not look to combine Praller with Hsu because Hsu requires that both alkylbenzene and terpene be present in the heat transfer fluid. The proposed combination of Hsu with Praller would require a terpene, an alkylbenzene, and a compound of Praller (such as a methyl pentane), and this combination of three different compounds is not the claimed invention (because alkylbenzene is an unsaturated compound), nor does it suggest the claimed invention.

Appellants respectfully submit that Praller fails to suggest anything that cures the deficiencies of Hsu, so the Examiner's proposed combinations fail. The suggestions relating to molecular weight similarities are assertions that have no basis in fact or in patent prosecution practice. As set forth above, different compounds have different properties and impart different properties to a mixture with other compounds. For example, methanol is poisonous whereas ethanol is not poisonous. Further, Appellants respectfully submit that the skilled practitioner would not make the proposed combination because since Praller does not address mixtures, one skilled in the art would not seek to introduce the compounds of Praller into Hsu. The skilled practitioner, seeing Table 2 of Hsu, would not seek to introduce the methyl pentanes and analogs thereof into Hsu. Hsu teaches that terpenes and alkylbenzenes in combination are useful, but

makes no provision for Praller's compounds (such as methyl pentanes), and Praller makes no provision for mixtures of any type.

Additionally, Appellants respectfully submit that even if they were combined, the proposed combination does not yield the claimed invention because, as previously stated, the proposed combination requires alkylbenzene as a component in the heat transfer fluid.

**E. Conclusion**

Appellants respectfully conclude that the currently rejected claims are not anticipated or obvious. The cited documents neither suggest nor disclose the claimed invention, whether considered alone or in the proposed combination. Indeed, the cited documents themselves teach away from that proposed combination, which can be made only with impermissible hindsight reconstruction based on review of the pending application. Further, the proposed combination would not be made by the skilled practitioner and, even if made, does not result in the claimed invention. Thus, the Examiner's rejection of the pending claims 1-15 should be reversed and instead the claims should be allowed as presented.

Respectfully submitted,

Solutia Inc.

Dated: October 25, 2010

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## VIII. CLAIMS APPENDIX

Below are the claims involved in the appeal:

1. Heat transfer fluid, for use over a broad range of temperatures, consisting essentially of a component selected from the group consisting of:

- (a) a mixture of at least two structurally non-identical saturated cycloalkane-alkyl or -polyalkyl components, wherein the cycloalkane moiety contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10;
- (b) a mixture of, at least, two structurally non-identical saturated aliphatic hydrocarbons having a linear or branched chain with from 5 to 15 carbon atoms; and
- (c) a mixture of, at least, a saturated cycloalkane-alkyl or -polyalkyl, wherein the cycloalkane moiety contains from 5 to 8 carbon atoms, the alkyl moiety contains from 1 to 6 carbon atoms with the proviso that the total number of carbon atoms in the alkyl moiety(ies) on the cycloalkane-alkyl and cycloalkane-polyalkyl compounds together is in the range of from 1 to 10, and a saturated aliphatic hydrocarbon having a linear or branched chain with from 5 to 15 carbon atoms;

at a level such that the composition has: a cloud point below -100 °C.; a vapor pressure, at +175 °C., below 1300 kPa; and a viscosity, measured at the cloud point temperature +10 °C., below 400 cP.

2. The heat transfer fluid in accordance with claim 1 wherein the alkyl moiety in the cycloalkane-alkyl or -polyalkyl component is selected from methyl, ethyl and propyl and mixtures thereof.

3. The heat transfer fluid in accordance with claim 1, wherein the aliphatic hydrocarbon in the mixture of, at least, two structurally non-identical saturated aliphatic hydrocarbons having a linear or branched chain contains from 5 to 10 carbon atoms.
4. The heat transfer fluid in accordance with claim 1 wherein the viscosity is below 300 cP.
5. The heat transfer fluid in accordance with claim 1 wherein the vapor pressure, at +175 °C., is below 827 kPa.
6. The heat transfer fluid in accordance with claim 1 wherein the cycloalkane-alkyl component is represented by: cyclohexane-methyl, -dimethyl, -ethylmethyl, -trimethyl, -ethyl and -propyl; cyclopentane-methyl, -dimethyl, -ethylmethyl, -trimethyl, -ethyl and -propyl; cycloheptane-methyl, -dimethyl, -ethylmethyl, -trimethyl, -ethyl and -propyl; and cyclooctane-methyl, -dimethyl, -ethylmethyl, -trimethyl, -ethyl and -propyl.
7. The heat transfer fluid in accordance with claim 1 wherein the aliphatic alkane is represented by: pentane-2,2,4-trimethyl; pentane-2,3,4-trimethyl; pentane-2-methyl, pentane-3-methyl; hexane-2-methyl; hexane-3-methyl; n-hexane; hexane-2,2-dimethyl; hexane-3,3-dimethyl; n-heptane; heptane-4-methyl; n-octane; and octane-2-methyl.
8. The heat transfer fluid in accordance with claim 1 wherein the ponderal ratio of the structurally non-identical cycloalkane components is in the range of from 95 : 5 to 5 : 95.



9. The heat transfer fluid in accordance with claim 8 wherein the cycloalkane components are represented by combinations of:

ethylcyclopentane/ethylcyclohexane;

ethylcyclopentane/n-propylcyclohexane;

methylcyclohexane/ethylcyclohexane;

methylcyclohexane/n-propylcyclohexane;

ethylcyclohexane/n-propylcyclohexane; and

methylcyclohexane/ethylcyclopentane.

10. The heat transfer fluid in accordance with claim 1 wherein the ponderal ratio of the cycloalkane component to the aliphatic hydrocarbon is in the range of from 97 : 3 to 10 : 90.

11. The heat transfer fluid in accordance with claim 8 wherein the ponderal ratio of the cycloalkane components is in the range of from 75 : 25 to 25 : 75.

12. The heat transfer fluid in accordance with claim 10 wherein the ponderal ratio of the cycloalkane component to the aliphatic hydrocarbon is in the range of from 80 : 20 to 25 : 75.

13. The heat transfer fluid in accordance with claim 12 wherein the ponderal ratio of the cycloalkane component to the aliphatic hydrocarbon is in the range of from 70 : 30 to 35 : 65.

14. The heat transfer fluid in accordance with claim 1 wherein the weight ratio of the aliphatic hydrocarbon to the cycloalkane component is in the range of from 90 : 10 to 60 : 40, whereby the aliphatic hydrocarbon is selected from 2-methylpentane, 3-methylpentane, 2,2,4-trimethylpentane and n-hexane and the cycloalkane component is selected from ethylcyclohexane and methylcyclohexane.

15. The heat transfer fluid in accordance with claim 1 wherein the cloud point of the composition is in the range of from -110 °C. to -175 °C.

## **IX. EVIDENCE APPENDIX**

None.

**X. RELATED PROCEEDINGS APPENDIX**

None.